REMARKS

Claims 1, 3, 4, and 6-14, are all the claims pending in the application. Claims 2 and 5 have been canceled without prejudice and/or disclaimer. Claims 7-12 have been withdrawn from consideration by the Examiner as being drawn to a non-elected group. Claims 13 and 14 have been added to further define the invention. Reconsideration and allowance of all the claims are respectfully requested in view of the following remarks.

Election/Restriction

Claims 7-12 have been withdrawn, pursuant to 37 C.F.R. § 1.142(b), from further consideration by the Examiner as being drawn to a non-elected group. Newly added claims 12 and 13 depend from claims 1 and 4, respectively. Therefore, newly added claims 12 and 13 should be examined with the elected group that includes claims 1 and 4.

Claim Objections

The Examiner objected to claims 1-6 as including informalities. Specifically, the Examiner requested that "non-metallic inclusion" be changed to --a non-metallic inclusion--. Accordingly, Applicants have amended claims 1, and 4 to correct this informality.

Claim Rejections - 35 U.S.C. § 112

The Examiner rejected claims 2, 3, 5, and 6 under §112, 2nd paragraph, as indefinite. Specifically, in claims 3 and 6, the Examiner noted that "rolling member" should be changed to --the rolling member-- so as to properly refer to this element. Accordingly, Applicants have amended claims 3 and 6 in a manner believed to overcome the Examiner's rejection. In doing so, however, the claims have not been narrowed.

Claim Rejections - 35 U.S.C. § 102

The Examiner rejected claims 1-6 under §102(b) as being anticipated by Japanese reference 11-190408 to Okubo et al. (hereinafter JP '408). Applicants respectfully traverse this rejection because JP '408 fails to disclose every element as set forth in Applicants' claims.

"[W]hen, as by a recitation of ranges or otherwise, a claim covers several compositions, the claim is 'anticipated' if *one* of them is in the prior art."[1] On the other hand, however, when the prior art discloses a range which touches, overlaps or is within the claimed range, but no specific examples falling within the claimed range are disclosed, a case by case determination must be made as to anticipation. In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with "sufficient specificity to constitute an anticipation under the statute." What constitute "sufficient specificity" is fact dependent. If the claims are directed to a narrow range, the reference teaches a broad range, and there is evidence of unexpected results within the claimed narrow range, it may be reasonable to conclude that the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims. See MPEP § 2131.03. In this case, the claims are directed to a narrow range that falls within the range disclosed by JP '408, and there is evidence of unexpected results. Further, the difference between the size of defect disclosed in JP '408 and that claimed is an order of magnitude. Therefore, JP '408 does not disclose the claimed range with "sufficient specificity" and is insufficient to establish anticipation.

First, the claims are directed to a narrow range that falls within the range disclosed by JP '408.

Claim 1 sets forth a toroidal-type continuously variable transmission component comprising a rolling member made of steel and having a layer formed at 0.4 mm or less from the surface thereof, wherein the layer does not contain a non-metallic inclusion having a maximum diameter of 0.115 mm or more.

For example, one embodiment of the present invention comprises a rolling member made of steel having a layer that does not contain a non-metallic inclusion having the maximum diameter of 0.115 mm or more. As shown in Fig. 5, for example, when the non-metallic defect has a maximum diameter of greater than 0.115 mm, the breaking time drastically decreases. Also note the specification at: page 6, line 5 - page 7, line 8; and page 20, line 9 - page 21, line

[1] *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (citing *In re Petering*, 301 F.2d 676, 682 USPQ 275, 280 (CCPA 1962)) (emphasis in original).

12. That is, the invention of claim 1 allows for defects of up to less than 0.115 mm within the layer extending within 0.4 mm or less from the surface of the rolling member.

Similarly, claim 4 sets forth a toroidal-type continuously variable transmission component comprising a rolling member made of steel and having a layer formed at 0.5 mm or less from the surface thereof, wherein the layer does not contain a non-metallic inclusion having the maximum diameter of 0.1 mm or more. That is, claim 4 allows for non-metallic inclusions of up to less than 0.1 mm near the traction surface of a rolling element.

In contrast to that in claims 1 and 4, JP '408 discloses that nonmetal interpositions 52, disposed within 1.5b of the traction surface, should not be greater than 10 μm (.01 mm). See Figs. 10 and 13. That is, JP '408 allows for defects of up to less than 0.01 mm and, therefore, discloses prohibition of a wider range on the size of inclusions that may be near the traction surface of a rolling member than does the present invention. In fact, the range of the present invention allows defects of an order of magnitude greater than those allowed by JP '408. Such prohibition in JP '408 leads to increased costs and difficulty of manufacture.

Second, there is evidence of unexpected results achieved by the present invention.

The Examiner notes that JP '408 teaches that the size of non-metallic inclusions are known to influence the strength of a material with respect to repeated bending stress.[2] From such a teaching, an artisan would expect that the larger the defect, the lower the strength and, therefore, would expect that larger defects near the traction surface of a rolling element lead to a reduction in its fatigue life. In contrast to the teaching of JP '408, the present inventors have unexpectedly found that even with a defect of up to less than .115 mm, located near the traction surface of a rolling element, a sufficient fatigue life—as well as strength—can still be attained.[3]

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[2] Office Action at page 4, item number 9, lines 4-9.

[3] Note: Figs. 5 and 6; page 6, line 5 - page 7, line 8; page 12, lines 4-7; and page 19, line 1 - page 22, line 16.

Third, the Examiner's reliance on JP '408 is misplaced.

In Item 9 of the Office Action, the Examiner indicated that "the manufacturing procedure off Okubo et al (JP'408) prevents non-metallic inclusions of high density from being present within a predetermined distance 1.5b of the traction surface, wherein a high density inclusion is 0.01mm or larger (for example, see sections 22 and 77)." It appears to Applicants that the above-mentioned understanding of the Examiner is based on a reading of USP'514.

The Examiner's understanding is misplaced, however, because the contents of JP'408 are slightly different from those of USP'514. When the USSN 09/220,763 (that became USP'514) was filed in the USPTO, the content of section 22—regarding a definition of the high density inclusion—was modified from the same section of the priority document. In other words, the definition of the high density inclusion of 10 μm was added to the description when the US application was prepared, so that the Japanese section 0022 is different from that of USP'514.

No definition regarding the high density inclusion is described in the JP'408 (for example, the sections 0022 and 0077). Accordingly, Applicants believe that the Examiner's rejection based on the JP'408 is groundless. In support of such accusation, enclosed herewith is an English translation of the specification and drawings of JP'408. Please refer the sections 0022 and 0077 thereof, and corresponding lines 21-42 of column 5 and lines 30-41 of column 17 in USP'514.

Further, USP '514 (JP '408) only teaches that non-metallic inclusion having high density should be located in an area that is distanced by 1.5b or more from the traction surface in the depth direction, whereas the same does not teach or suggest an idea that non-metallic inclusions of 0.115 μm are present in an area defined by the depth less than 1.5b.

The Present Invention

(1) Background of the Invention

Although the high-purity steel for a rolling bearing is manufactured in a highly controlled line in order to remove non-metallic inclusions which give rise to the defects of the high-purity steel, actually, it is impossible to remove all of such defects. And even in the high-purity steel, once in a great while, there can suddenly occur a defect, wherein it is impossible completely to prevent such a sudden occurrence of the defect. Especially, a large-size inclusion is

fundamentally not allowed to exist in the vicinity of the surface of the high-purity steel because it gives rise to the bending fatigue rupture of the high-purity steel in a CVT disk.

(2) Object of the Present Invention

The present invention aims at eliminating the drawbacks found in the conventional defect detect methods. Accordingly, it is an object of the invention to provide an extended-life, highly reliable CVT member which is hard to produce exfoliation in the slide surface thereof.

(3) Achievement of the Object

As shown in a diagram of Fig. 5, the inventors have found that a non-metallic inclusion (defect) having the predetermined maximum diameter of less than 0.115mm, that is found in the depth of 0.5mm from the surface, does not disadvantageously influence fatigue life, whereas the non-metallic inclusion (defect) having the maximum diameter of 0.115mm or more, that are found in the depth 0.5 mm or less from the surface, reduces its fatigue life.

As shown in a diagram of Fig. 6, the inventors have found that when the non-metallic inclusion (defect) having the predetermined diameter of 100μm is found in the depth less than 0.4 mm from the surface, the fatigue life is drastically decreased, whereas the non-metallic inclusion (defect) having the predetermined diameter of 100 μm is found in the depth of 0.4 mm or more from the surface, the fatigue life is not drastically decreased.

The Examiner's Assertion

Referring to sections 11-14 of JP'408, the Examiner asserted that JP'408 discloses the size of non-metallic inclusions are known to influence the strength of a material with respect to repeated bending stress. But at a section 0010 and Figs. 12 and 16, JP'408 teaches that the non-metallic inclusion having high density is mainly distributed/located at 0.3D portion. The number of the inclusions each having 10 μm or more at the 0.3D portion is indicated in a graph of Fig. 13. As shown in Fig. 13, the numbers of the non-metallic inclusions of 10 μm or larger per 300mm^2, at less than 0.3D portion in depth, are 6 or 15.

In addition, JP'408 or (USP'514) (particularly at Table 2) teaches that the durability of the traction surface is enhanced when the depth is larger than or equal to 1.5b as well as the ((B/A)x100%) area more than 33%. Further, JP'408 or (USP'514) teaches that the number of the non-metallic inclusion is relatively large at the 0.3D area.

On the other hand, JP'408 or (USP'514) does not teach or suggest that non-metallic inclusions having 0.115mm or more may exist within 1.5b in the depth direction from the traction surface. That is, the JP'408 or (USP'514) only teaches that the non-metallic inclusions having high density is not existed within 1.5b, in the depth direction from the traction surface. However, the JP'408 or (USP'514) does not teach or suggest that a non-metallic inclusion having 0.115 mm or more is not existed at or within 1.5b in the depth direction from the traction surface. In other words, JP'408 or USP '514 does not have any description regarding an existence or non-existence of the inclusion having 0.115 mm or more.

For any of the above three reasons, JP '408 does not disclose Applicants' claimed range with "sufficient specificity" and, therefore, is insufficient to establish anticipation of either claim 1 or claim 4. Likewise, the subject matter of dependent claims 3 and 6 is not anticipated by JP '408.

Conclusion

Claims 13 and 14 have been added to further define the invention. Claims 13 and 14 are allowable over the prior art by virtue of their dependency from claims 1 and 4, respectively. Further, claims 13 and 14 are allowable over the prior art and, in particular, JP '408 for the following additional reasons.

Claim 13 sets forth that a non-metallic inclusion is disposed within the layer, wherein said non-metallic inclusion has a maximum diameter of between greater than 0.01 mm and less than 0.115 mm. Similarly, claim 14 sets forth that a non-metallic inclusion is disposed within the layer, wherein the non-metallic inclusion has a maximum diameter of between greater than 0.01 m and less than 0.1 mm. In contrast, such non-metallic inclusions are strictly prohibited by JP '408. Therefore, JP '408 does not anticipate either one of claims 13 and 14.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 2 and 5 have been canceled without prejudice and/or disclaimer.

The claims have been amended as follows:

1. (Amended) A toroidal-type continuously variable transmission component comprising:

a rolling member made of steel and having a layer formed at 0.4 mm or less from the surface thereof,

wherein the layer does not contain a non-metallic inclusion having the maximum diameter of 0.115 mm or more.

3. (Amended) The toroidal-type continuously variable transmission component according to claim [2] 1, wherein the rolling member is at least one of an input disk, an output disk, an inner ring of a power roller bearing, and an outer ring of the power roller bearing which are constituting said toroidal-type continuously variable transmission.

4. (Amended) A toroidal-type continuously variable transmission component comprising:

a rolling member made of steel and having a layer formed at 0.5 mm or less from the surface thereof,

wherein the layer does not contain a non-metallic inclusion having the maximum diameter of 0.1 mm or more.

6. (Amended) The toroidal-type continuously variable transmission component according to claim [5] 4, wherein the rolling member is at least one of an input disk, an output disk, an inner ring of a power roller bearing, and an outer ring of the power roller bearing which are constituting said toroidal-type continuously variable transmission.

Claims 13 and 14 have been added as new claims.